Results physicist event scan at MSU

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A number of simulated neutrino events were scanned at the end of 2004. The following documents the results of this scan. The scan sheets are available if an independent evaluation is desired.

Items recorded during the scan procedure:

1. Locate primary vertex position in two views
2. Count the number of EM showers that are likely associated with the primary vertex
3. Count and number the primary vertex tracks
4. Identify any primary vertex track that "develops" into an EM shower (showering track)
    a) In both views, shower must start directly over the track. No photon conversions
    b) 3 sequential hits I > 1.5 defines the start of the EM shower.
5. For showering tracks, measure distance between primary vertex and EM shower start.
6. Measure the number of hits with ionization < 1.5 between primary vertex and start of EM shower.

Scan of 50 electron neutrino CC interactions.

* 8 events with showering track have an EM-start at a point < 1.5 cm from the primary vertex, and therefore would be removed by NC motivated cuts.
* All other showering tracks had at least 2 hits with Ion < 1.5 before shower start.
* 1 more event with a 1.5 cm < track length <10 cm would be removed by a cut, motivated by NC events, on > 3 EM showers in the event.

Scan of NC events

Out of 265 NC events, 35 had an energy deposition within range of the electron signal. Of these 35 NC events

* No events had a showering track with EM-start >6 cm from the primary
* 7 events had a showering track with EM-start <1.5 cm, and are removed by cut.
* 2 events had showering tracks 1.5 cm < EM-start <10 cm from primary vertex, and these events had 4 EM showers, and are removed by this cut.

Bottom line: 82 +/– 6% electron CC efficiency, and upper limit (non-rigorous) on NC background events of ~ 2 events, or 5% of the NC background. At this level the NC background is about a factor of two below the electron neutrino beam contamination.